FURTHER EXPERIMENTAL DATA ON THE VALUE OF STUDYING FOREIGN LANGUAGES

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In the issue of the *School Review* for December, 1915, the writer presented certain data on the effect of the study of foreign languages upon a pupil's general scholastic record, upon the size of his English vocabulary, upon his knowledge of English grammar, and upon his ability to use English correctly. The general results of those findings were that the study of foreign languages materially increases a pupil's knowledge of English grammar, that it increases to a small extent the range of his reading vocabulary, and that it modifies only slightly his knowledge of correct grammatical expression or his general scholarship.

The purpose of the additional experiments to be reported here was to determine the effect of foreign-language study in still other directions and to ascertain, if possible, how much of the difference n the performance of pupils with or without a considerable amount of language study may be due to the actual training effect of the language study and how much may be due to a difference in the original ability of the pupils.

In order to obtain concrete information on these problems, a variety of tests was carried out with 177 university students. The results of these tests are exhibited in Table I. The numbers in row 1 divide the students into groups according to the number of years of foreign-language work. On the right side of the table the same students are separated into two groups according to whether they had studied Latin or not irrespective of other language work. The second row of figures gives the number of students in each group.

The first test consisted in the writing of an extemporaneous composition in ten minutes on the topic "What Abraham Lincoln Sees" (referring to the Lincoln statue on the upper campus of the

TABLE I

1. Years of foreign language	1–2	3–4	5–6	7–8	9–15	Percentage 9–15 Group / 1–2 Group	No Latin	Latin
2. No. of persons	14	53	49	40	21	.....	59	112
3. Composition (Hillegas scale)	67.6	69.3	68.7	71.5	78.2	15.7	67.9	72.6
4. Words written	140.7	158.3	162.1	168.1	181.4	28.9	158.7	165.0
5. Different words used	82.3	86.6	96.6	96.8	111.6	35.4	89.6	95.2
6. Reading—speed	4.5	5.4	5.5	5.2	6.0	33.3	5.4	5.5
7. Reading—comprehension	60.0	65.0	70.5	65.7	68.2	13.7	64.0	69.0
8. Perception—A-test	66.2	66.8	66.2	67.8	66.1	0.0	66.2	67.1
9. Perception—form	7.5	7.7	7.8	7.5	8.0	6.7	7.8	7.9
10. Memory—words	7.4	7.2	7.3	7.2	7.2	−2.7	7.3	7.3
11. Association—free	23.5	25.9	22.6	29.9	28.7	26.4	25.3	26.3
12. Association—synonyms	15.4	15.0	15.9	15.4	14.2	− 7.7	15.0	15.4
13. Imagery—forms	7.0	7.6	7.0	7.1	7.8	11.3	7.2	7.4
14. Imagery—words	5.0	5.7	5.1	5.7	6.1	21.4	5.5	5.6
15. Years of English	5.1	4.9	5.3	5.5	5.5	.....	5.0	5.3
16. Grades—first year of high school	83.0	85.7	83.7	86.7	88.0	.....	84.5	85.7

University of Wisconsin). These compositions were evaluated by means of the Hillegas-Thorndike scale, each composition being rated by three judges. The numbers in row 3 refer to the values of the compositions in that scale. The larger the numbers are, the better is the quality of the composition. The numbers in the vertical column under percentage refer to the gain of the 9–15-year group over the 1–2-year group. To illustrate, the compositions written by the students who had studied foreign languages from one to two years had an average value of 67.6 in terms of the Hillegas-Thorndike scale. The compositions written by the students who had studied foreign languages from nine to fifteen years had an average value of 78.2, or 15.7 per cent better than those written by the 1–2-year group.

The numbers in row 4 give the average lengths of the compositions written by the different groups as indicated by the number of words written in ten minutes. It will be noticed that the average length of compositions increases materially with additional years of foreign-language study. The 9–15-year group wrote in ten minutes compositions which were 28.9 per cent longer than those of the 1–2-year group.

The next problem was to discover whether the range of variety of the writing vocabulary varied with the different groups. The figures in row 5 give the average number of different words in each composition. The 1–2-year group wrote on an average 82.3 different words in a composition whose average length was 140.7 words. There is a considerable increase from group to group. The 9–15-year group shows a gain of 35.4 per cent over the 1–2-year group. This gain, however, is not as large as it seems to be at first glance. In fact, the range of the writing vocabulary does little more than keep pace with the increase in the length of the compositions. In case of the 1–2-year group, 82.3 different words in a total of 140.7 is 57.1 different words per 100 words written; and in case of the 9–15-year group, 111.6 different words in a total of 181.4 is 61.1 different words per 100 words written.

The next test was a reading test as described elsewhere.[1] Row 6, for speed of reading, gives the number of words read per second,

[1] D. Starch, *Educational Measurements*, p. 20.

and row 7, for comprehension, gives the number of words written to express the thought-content of what had been read in the allotted time. Both aspects of reading ability show a marked increase from group to group.

There are two general factors which enter into the increased ability in composition or in reading with the increasing years of foreign-language study: (1) the training effect of the study of languages and (2) the selection of pupils. The persons in the 9–15-year group wrote better compositions and had better ability in reading than the 1–2-year group, partly because of greater linguistic training and partly because of their better original capacity. The purpose of the remaining tests was to measure, if possible, the relative shares of these two factors.

The test designated as "Perception A-test" is the well-known test bearing that name. The numbers in row 8 give the number of A's cancelled by the various groups in one minute.

The perception test in row 9 was a geometrical form test which has been used for several years in the laboratory of the University of Wisconsin. It consisted in crossing off in one minute as many geometrical forms of a certain kind as possible printed on a card among a variety of similar figures. The numbers in row 9 refer to the number of figures crossed off in the allotted time.

The test in row 10, memory for words, consisted in reading to the persons a series of ten monosyllabic nouns at the rate of one word per second. The subjects then wrote down all the words that they could recall. This test was repeated with four different series of ten words each. The numbers in row 10 give the average number of words retained.

The test designated as "Association—free" was carried out by giving a stimulus word and having the persons write as many associated words as they could in thirty seconds. Five stimulus words were used with an allowance of thirty seconds for each. The numbers in row 11 refer to the average number of associations made per person.

The test "Association—synonyms" consisted in giving a series of ten stimulus words and allowing fifteen seconds to each word for writing as many synonyms as possible. The figures in row 12 indicate the number of synonyms written in the allotted time.

The imagery test, row 13, consisted in a series of ten special tests of which the following is an example: "Consider a cube. Each face has a letter on it. *A* is on the face toward you, *B* on the face to your right, *C* on the back face, *D* on the left face, *E* on the top face, and *F* on the bottom face. Now turn the cube so that *F* is toward you and *D* is on top. What letter is on the right face and what letter is on the left face?" These tests, of course, were carried out mentally without the use of drawings or figures. The numbers in row 13 refer to the average number of tests done correctly by the different groups.

The test in row 14 was also designed as a test of imagination and consisted in presenting to the subjects seven words, one word at a time, spelled orally backward by the experimenter. The subjects then put down the word if they knew what it was. This was done mentally without first writing down the letters in reversed order. Row 14 gives the average number of the words out of seven that were recognized correctly.

The results of the experiments show that the gain in quality of composition of the 9–15-year group over the 1–2-year group is 15.7 per cent and that the difference in general ability between these two groups is 7.9 per cent if tests 8–14 may be regarded as measuring the difference in original ability. The difference between 15.7 per cent and 7.9 per cent, or 7.8 per cent, would be the residuum due to the additional language training which the 9–15-year group had had.

In order to make a crucial comparison as to how much of the greater composition ability was due to the greater original capacity of the pupils and how much was due to their greater training in language, the grades received by these students in all the subjects carried during the first year of the high school were obtained from the entrance records of the University. The amount of difference in original ability of the groups who later pursued varying amounts of language work would be definitely indicated by this method, since none had had more than one year of foreign language. The difference in the scholastic grades at the end of the first year of the high school between those who later pursued languages for a total of 9–15 years and those who pursued languages for a total of 1–2 years could certainly not be due to language training.

Row 16 gives for the different groups the average scholarship grades during the first year of the high school. It will be noted that there is a steady increase from group to group. The 9–15-year group had an average grade of 88.0, or five points higher than the 1–2-year group.

The next problem was to compare in common terms the five points of difference in scholarship on the percentile scale with the difference of 10.6 in quality of composition as measured by the Hillegas scale. To reduce these two types of measurements to commensurate units, fifty-eight compositions were rated by four persons both by the percentile method and by the Hillegas scale. In case of the percentile scale, 70 was assumed as the passing grade. Eighteen of these compositions had a value on the Hillegas scale between 66 and 70, with an average value of 68.3. Their average percentage value was 79.1. Sixteen compositions had a value on the Hillegas scale between 76 and 80, with an average value of 78. Their average percentage value was 83.7. These two groups are taken because they coincide most closely with the composition values of the 1–2-year group and the 9–15-year group respectively. We may now equate the two methods of rating compositions as follows: The difference between 68.3 and 78.0, or 9.7, Hillegas scale, is equal to the difference between 79.1 and 83.7, or 4.6, percentage scale. Hence 1.0 point on the percentage scale equals 2.1 points on the Hillegas scale and the difference of five points, percentage scale, in original scholarship between the 1–2-year group and the 9-15-year group would be 10.5 in terms of the Hillegas scale. The surprising result seems to be that the difference of 10.6, Hillegas scale, in quality of composition between these two groups is approximately equaled by 10.5, the difference in original scholarship when expressed in terms of the Hillegas scale. The conclusion seems, therefore, unavoidable that the difference in ability in English composition is due practically entirely to a difference in original ability and only to a slight or no extent to the training in foreign languages.

The increase in length of composition and in speed of reading is large and very probably in excess of the difference in original ability. Training in foreign language seems to have produced a distinct effect in greater fluency of words in writing and in more rapid perception of words in reading.